

## A New Species of *Zetomimus* (Acari: Oribatei) from Japan

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**ABSTRACT**—A new species *Zetomimus brevis* is described. It is semiaquatic and able to walk on the surface of water, that is exceptional for oribatid mites. Some concepts about the taxonomy of the genus are mentioned.

### INTRODUCTION

Hull [1] created *Zetomimus* for two species, *Oribata furcata* Warburton et Pearse [2] and *Oribates boothianus* Hull [3]. Balogh [4] treated *Ceratozetes argentinensis* Hammer [5] as the member of *Zetomimus*. The three species were indicated to be monodactyle in their original descriptions. Later, Shaldybina [6] found *Z. furcatus* has two side claws on legs III and IV. She treated *Hammobates* Hammer [7] as a synonym of *Zetomimus* because the genus *Hammobates* is characterized by that legs I and II are monodactyle but legs III and IV are tridactyle just like *Z. furcatus*. Though *Z. argentinensis* is not proved to have more claws, it is natural to be classified to the genus considering its characteristic features such as body contours, arrangement of notogastral setae and areae porosae and so on. As for *Z. boothianus*, its assignment to the genus is doubtful. As the author unfortunately does not know its rediscovery, the species is not mentioned in this paper furthermore.

In this paper, a new species of *Zetomimus* is described from Japan. All the members of the genus hitherto known were collected from aquatic or semiaquatic environment. The Japanese one is usually found by pond or paddy field, having the ability to walk on the surface of water like the European species, *Z. furcatus* [8], and never sinking in the water. It may well be said that *Zetomimus* species live a semiaquatic life.

In the following description, a metallograph was

used in order to study surface textures of integument. Some of surface structures such as wrinkles and scales are only detected by the metallograph and they are hardly observable in the use of a usual microscope under transparent illumination. In such cases the expressions "faint" or "faintly" are used in the present paper.

### *Zetomimus brevis* sp. n.

(Figs. 1-3)

*Dimensions* For 7 specimens, body length 360(383)400  $\mu\text{m}$ , width 275(289)300  $\mu\text{m}$ .

*Prodorsum* Rostrum with a pair of short, parallel ridges that become dull dents anteriorly. Between the ridges, rostrum nearly truncated at the tip, and faintly wrinkled dorsally (Fig. 1C). In dorsal view, these structures are not visible and rostrum seems to be simply rounded (Fig. 1A). Lateral rostral margin forming a narrow but conspicuous ridge with a thin outside blade, continued from rostral dent, covering tip of genal process and becoming anterior carina *ca*.

Rostral seta fairly barbed dorsolaterally, arising from a short, weakly swollen ridge. Tutorium smoothly curved at the border, and pointed at its free tip. The tip nearly at the level of insertion pore for rostral seta. Antiaxial surface of tutorium with long, conspicuous wrinkles. A few light spots of internal structure found outside the base of tutorium.

Lamella overhanging laterally, bending down abruptly under bothridium and being continued to the root of bothridium. Its surface with faint wrinkles and dots dorsally and long wrinkles ventrally. Lamellar costa only faintly developed. Cuspis cylindrical, smooth, 0.55 times as long as

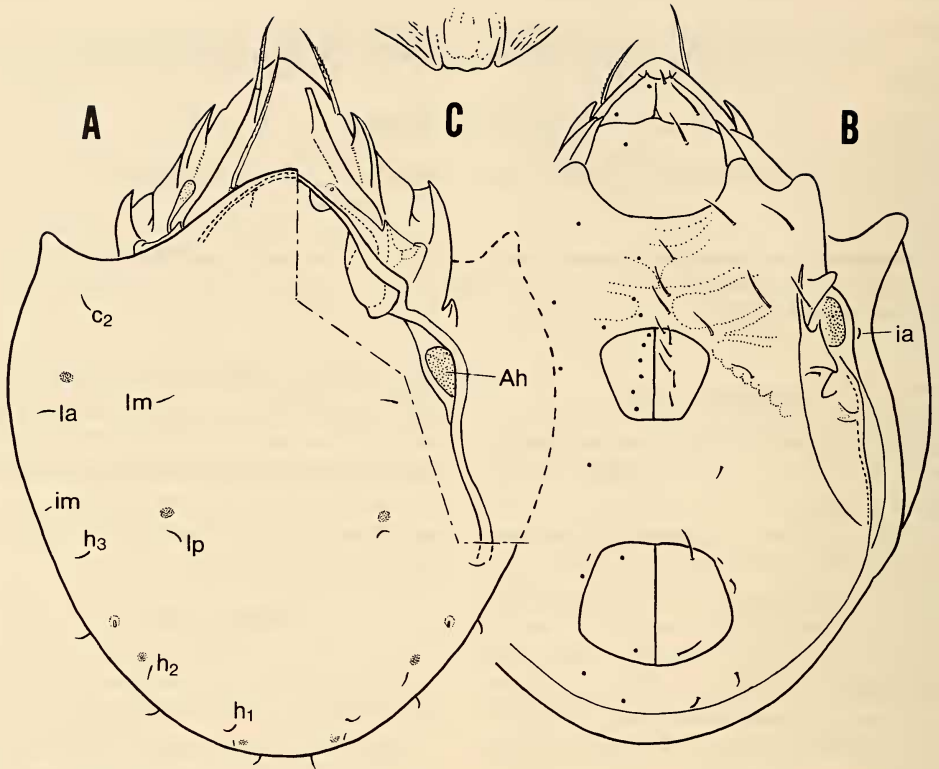


FIG. 1. *Zetomimus brevis* sp. n.

A. Dorsal aspect, also showing posterior border of prodorsum and an organ *Ah* by removing right shoulder of notogastral plate; B. Ventral aspect; C. Rostral tip in anterior view.

lamella and shorter than the mutual distance between the bases of both cuspis. Its diameter almost the same throughout its length. Cuspis converging anteriorly; the mutual distance of their tips 0.75 times as long as that of their bases. Lamellar seta as long as lamella, having a few scale-like, minute barbs dorsally.

Dorsal surface of prodorsum smooth. Translamella is absent. The lateral contour of prodorsum almost straight midway. Pore for interlamellar seta located in front of dorsosejugal, but only partly concealed by notogastral plate. Under transparent illumination the anterior border of notogaster is easily overlooked, because the edge is a fairly thin, free blade protruding beyond a thick, conspicuous dorsosejugal. The blade narrowest at the anteriormost part, becoming wider posteriorly to form pteromorph. Interlamellar seta

arising on a long, weakly swollen ridge which continues from the side of bothridium. The seta inclines anteriorly with minute barbs dorsally; the barbs denser than those of lamellar seta but sparser than those of rostral one.

Bothridium spindle-shaped in anterolateral view, protruding laterad posteriorly. Scale *sdm* pointed and scale *psdm* scarcely expanded at its free border; the border between the two scales consisting of two edges, upper and lower. Scale *svm* narrow, concealed under *sdm* in dorsal view, while scale *svl* is large but thin; border between these two scales strongly curved inward. Sensillus club-shaped, seemingly almost smooth but scattered with very faint, minute scales on distal half. Exobothridial seta slender.

*Podosoma* Genal process well developed. Its dorsal carina *dr* covered by carina *ca*; the two

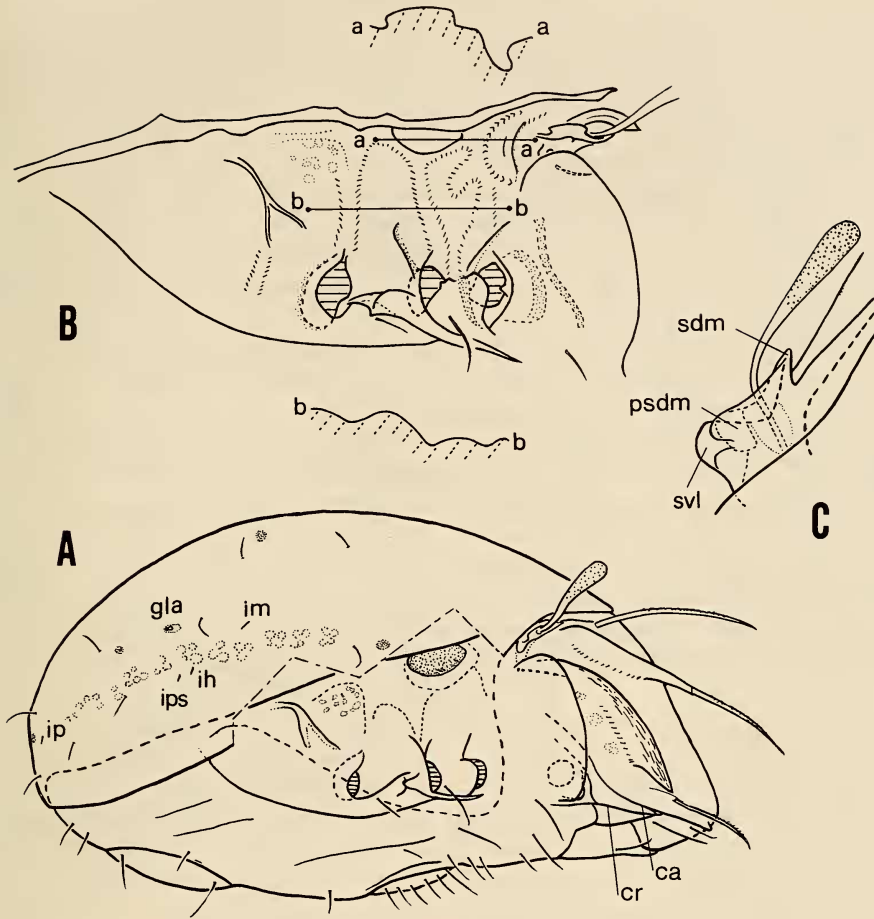


FIG. 2. *Zetomimus brevis* sp. n.

A. Lateral aspect, pteromorph removed; B. Podosome in latero-ventral view (a-a and b-b show schematic section); C. Bothridium and sensillus in dorsal view.

carinae fusing posteriorly. Central carina *cr* strong, becoming posteriorly acetabular tectum I. Ventral fin thin, posteriorly covered by mentotectum.

Pedotectum II rather trapezoidal in lateral view. A short ridge extending upward from the upper end of pedotectum II. Custodium sharply pointed, separated from acetabular tectum III, discidium and circumpedal carina. Another short ridge extending upward from acetabular tectum III. Discidium resembling a triangular pyramid; the anterior plane continued to the posterior plane of pedotectum II, the upper plane convex, and the lower plane concave.

A very deep and large reniform cavity is present behind bothridium where so-called organ *Am* is absent. Area porosa *Ah* especially well developed, consisting of an externally excavated, membranous integument with dots and a strongly sclerotized circular ring; the organ extending horizontally and facing downward. Behind the organ *Ah* found an area where many clear spots are scattered. A bifurcate ridge running behind the area.

*Epimeral region* Epimeral plates smooth at the middle but faintly sculptured with short wrinkles at both sides. Epimeral setae relatively long; setae *1a*, *2a*, *3a* and *4c* the shortest among them, setae *3b*, *4a* and *4b* longer, and setae *1b*, *1c* and *3c* the

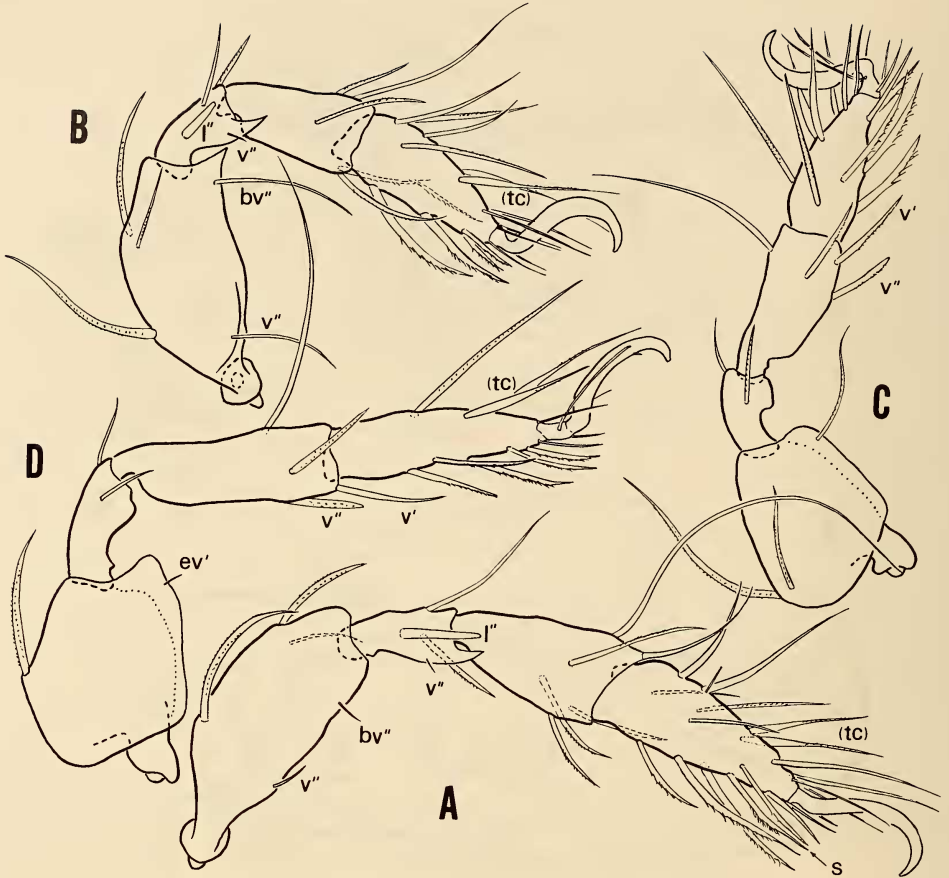


FIG. 3. *Zetomimus brevis* sp. n.

A, B, C and D show antiaxial side of legs I, II, III and IV, respectively.

longest, about 1.7 times longer than the shortest ones. Setae *1a*, *2a*, *3a* and *4c* smooth, setae *1b* and *1c* finely barbed, and the others only faintly barbed. All epimeral setae slightly inclined anteriorly.

**Ano-genital region** Genital aperture oblique to body axis, opening anterolaterally (Fig. 2A). The aperture especially wider anteriorly, 1.3 times wider than long, anterior border being smoothly rounded. Genital plate smooth, convex along genital setae and slightly concave outside them. Six genital setae slender, arranged in a row on the plate; the anteriormost seta as long as epimeral seta *3a* and 1.3 times as long as the other genital ones. Aggenital setae slender, shorter than anal

ones.

Anal aperture slightly long sideways. Anal plates smooth and convex. Anal setae slender, shorter than genital ones. Adanal fissure short, located just near the aperture. Adanal setae slender, half as long as anal setae. Ventral plate smooth in ano-genital region.

**Notogaster** Notogastral plate clearly decolorized near anterior border and along pteromorphous margin. The surface looking smooth but very faintly sculptured irregularly. Anterior border narrowly hanging over prodorsum. Lateral border under pteromorph strongly undulating. Ten pairs of setae slender, only slightly curved; no seta on pteromorphs. Distance of seta *c*<sub>2</sub> from

anterior border of pteromorph about half as long as distance  $c_2-la$ . Seta *la* inserted at about mid-distance along length of pteromorph. Seta *lm* at the level of seta *la*. Mutual distance of setae *lm* wide, twice as long as distance *la-lm*. The mutual distance of setae *lp* 0.8 times as long as that of setae *lm* and almost equal to distance  $c_2-la$ . Seta  $h_3$  just behind the level of seta *lp*. Distance between  $lp-h_3$  almost equal to that between *la-lp*. Distance  $h_3-h_2$  almost equal to distance  $h_2-h_1$ , and a little longer than mutual distance of setae  $h_1$ . Distance  $ps_3-ps_2$  about equal to distance  $ps_2-ps_1$ , and about twice as long as mutual distance of setae  $ps_1$ .

Four pairs of areae porosae round, indistinct;  $A_a, A_1$  and  $A_2$  near setae *la, lp* and  $h_2$ , respectively, while  $A_3$  at the middle level between setae  $ps_1$  and  $h_1$ . Five pairs of lyrifissures short; lyrifissure *ia* just near *Ah*.

**Legs** Setation: trochanters 1-1-2-1, femora 5-5-3-2, genua 3(1)-3(1)-1(1)-2, tibiae 4(2)-4(1)-3(1)-3(1), tarsi 18(2)-15(2)-15-12. Tarsi I and II monodactylous. Tarsi III and IV heterotridactylous; side claws very thin, curving only slightly. An acute ventral spur on each of genua I, II and femur II. Lamelliform ventral ridge on femora III and IV as well as trochanters III and IV. Remarkable setae are as follows. Tarsi: all setae *tc* swollen at basal half. Tibiae:  $v''$  III and IV dully pointed, thicker and shorter than  $v'$  III and IV, respectively. Genua:  $l''$  I and II very thick and dully pointed,  $v''$  I and II minute. Femora:  $bv''$  I and  $v''$  I thin,  $ev'$  IV minute. Trochanters:  $v'$  IV minute, while setae on other legs barbed, thin and very long.

**Type-series** Holotype (NSMT-Ac 9794 in spirit) and 7 paratopotypes: Ishinden-Kōzubeta, Tsu, Mie, May 4, 1986, collected and extracted by N. Ohkubo from dead leaves that are cast at the shore of a pond. All specimens will be deposited in the collection of the National Science Museum (Nat. Hist.), Tokyo.

**Remarks** The type species *Z. furcatus* has been collected from Europe frequently. Though the information on its morphology is not sufficient, the illustrations that were given by Warburton and Pearce [2], Willmann [8], Schweizer [9] and Shaldybina [6] indicate some specific characters: 1)

long cuspis, 2) fairly thick base of cuspis, 3) barbation on sensillus (except in [8]), and 4) relatively pointed tip of sensillus (except in [8]). The body length (500  $\mu$ m [2] and 440  $\mu$ m [8]) is greater than that of the present new species. Argentine species *Z. argentinensis* is characterized by 1) very long cuspis, 2) presence of hairs on sensillus, 3) large areae porosae, 4) more posterior position of setae  $ps_3$ , 5) long notogastral setae, 6) more setae on tibia II and 7) longer and shorter setae on leg II. Its body length 500  $\mu$ m. Two species were recorded from Chile: *Z. cristatus* (Hammer [7]) and *Z. spinosus* (Hammer [7]). The former species is different from the new species in 1) long cuspis, 2) short lamellar seta, 3) distinct areae porosae on notogaster, 4) anterior position of genital seta  $g_2$ , 5) lateral position of adanal seta  $ad_3$  and 6) thick lateral claws of leg IV. The body length 580  $\mu$ m. The latter species is characterized by 1) anteriorly tapering cuspis, 2) widely separated lamellae and 3) anterior position of genital setae  $g_2$  and  $g_3$ . The body length 380  $\mu$ m.

## DISCUSSION

The genus *Zetomimus* Hull was not popular at first and its type species was rather known as a member of *Ceratozetes* until Balogh [10] accepted the genus as a well isolated taxon. Later, Shaldybina [11] constructed new system of Ceratozetoidea where she gave a family level taxon Zetomimidae to the genus. Her taxon was adopted in the identification keys of Balogh [4]. During the present study, however, the author notices that *Zetomimus* fairly resembles *Ceratozetes*. Behan-Pelletier [12] presented fine diagnosis of *Ceratozetes*. Examining his description, one can find that the present new species has almost all features of *Ceratozetes* as to adult. The genus *Zetomimus* is distinguishable only by some additional features as mentioned after. The family Ceratozetidae contains many genera which have little resemblance to *Ceratozetes*. The author, therefore, is doubtful about the family level separation of the two genera.

The genus *Zetomimus* is distinguished from *Ceratozetes* as follows: 1) legs I and II monodactyle and legs III and IV tridactyle, 2) notogaster

relatively wide, 3) lamella and cuspis relatively narrow, 4) sensillar head club-shaped, 5) area porosa *A<sub>7</sub>* situated just before seta *lp*, 6) median part of rostral tip not excavated. The next features have a possibility to become generic characters: 1) organ *Ah* extremely developed, 2) the border between *sdm* and *psdm* of bothridium only slightly curved, and 3) the presense of membranous secretion under pteromorphs and near dorso-sejugalis.

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